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Non-scale endogenous growth effects of subsidies for exporters ☆

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ABSTRACT

We built a general equilibrium endogenous growth model in which final goods are produced either in the relatively skilled-labour intensive exports sector or in the relatively unskilled-labour intensive domestic sector. We show that, by affecting the technological-knowledge bias, subsidies explain the simultaneous rise in the exports sector, the skill wage premium and the economic growth rate. Then, to shed light upon the causal nexus between production-related subsidies and exports, we use a Portuguese longitudinal database (1996–2003) and implement a propensity score matching approach. Empirical results seem to prove the theoretical predictions: subsidies generate the rise in the wage premium of exporters and the increase in the relative size of export sector, even if no impact of subsidies is found in the capacity of transforming domestic firms into new exporters.

1. Introduction and literature revision

Exports are crucial for the economic growth of most countries and it is well known that firms must overcome several difficulties and costs in order to be able to export. Some recent theoretical models (e.g., Chaney, 2008; Melitz, 2003) and some empirical studies (e.g., Wagner, 2007, 2011) found entry sunk costs of exporting as decisive. Meanwhile, several governments have designed several export promotion policies in order to deal with such costs and difficulties, even if direct export subsidisation may be forbidden by World Trade Organization (WTO) rules.

Export subsidies, one of those policies, can be either specific (*lump-sum*) or *ad-valorem* payments to firms that ship goods abroad. Such subsidies can increase exports as they help supporting some of the exporting costs, induce more sales and create more earnings for exporters. However, such positive effects could become negative when the distribution of subsidies, instead of being a way to encourage trade orientation (by subsidizing firms with comparative advantage) relies on subjective methods (based on arbitrary decisions) and becomes a rent-seeking mechanism. In this case, the competition among firms to obtain them may generate clear negative effects (e.g., Mitra, 2000) and the complexity of such decisions may open paths to misuse abuse (e.g., Nogués, 1989).

Given such problems and the known difficulty in obtaining relevant data of export subsidies (from many public agencies), many researchers became to study, in alternative, the effects of general production-related subsidies on exports. Such type of subsidies may well play a relevant role in promoting exports (without violating WTO rules) and are easier to collect.[1] In empirical terms, production subsidies, not specifically created to promote exports, are a type of financial assistance that firms receive from domestic authorities and the European Union (EU), aimed at lowering their production costs and prices of the goods produced or even at providing a proper payment for productive factors. In accounting terms, they represent assistance, in the form transfer of resources, in return for past or future compliance under certain conditions related to firm's activities. Due to data limitations, we do not have means to distinguish between direct and indirect (R&D) subsidies, as we did in the theoretical model. Moreover, we have no information about the probability of such subsidies had been tailored for some sectors or for firms which have some specific characteristics.

There is, however, little evidence that firm specific subsidies of all types (e.g., related to promote investment in technology, in training,

☆ This paper contains statistical data from the Portuguese National Institute of Statistics (INE). The data has been used with the permission of the INE but does not mean that it endorses the interpretation or analysis of such data.

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[1] They are freely available from firms´ accounts, not requiring a public agency source.

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in physical capital or in specific competences) can play a significant role in encouraging export activity (e.g., Girma et al., 2009a,b; Görg et al., 2008). This lack of evidence may be caused by many reasons but too many different institutional arrangements (both formal and informal) designed to help reduce the sunk costs of exporting could make it difficult to distinguish the mechanisms that are effective in promoting exports and those that are not.

The main motivation of this paper is to discuss the role of subsidies, especially production related subsidies, for exports; this analysis is done bearing in mind that there is a methodological difficulty in testing such relationship given that it is impossible to observe firms with and without such subsidies. Thus, in order to better evaluate which are the effects of (production) subsidies on exports, we present both a theoretical model and an empirical analysis. In both cases, we discuss the relationship between general production subsidies obtained by firms and several aspects related to their internationalisation path, such as their ability to promote R&D, to increase sales, to enhance market shares and also their capacity to pay higher wages.

From the theoretical perspective, international trade literature has given little attention to the role of endogenous technological knowledge (e.g., Rivera-Batiz and Romer, 1991). We contribute to fill this gap, by starting this paper with a general equilibrium endogenous R&D growth model in which, in line with Rodrik (2006),[2] final goods are produced either in the relatively skilled intensive exports sector or in the relatively unskilled intensive domestic sector. Final goods use labour and quality-adjusted intermediate goods. Building on Acemoglu (2009, Ch. 15) scale-dependent horizontal R&D model, scale effects are removed (as proposed by the main related literature —e.g., Jones, 1995) and vertical R&D is introduced (e.g., Acemoglu, 2009, Ch. 14).

Given that many proposals to promote exports include R&D funding, in our theoretical model, due to the relationship between intermediate-goods production and R&D, R&D directed to improve "exporter" intermediate goods can be encouraged by either a direct subsidy or by a subsidy for the production of intermediate goods. As observed by Girma et al. (2009a), more than half of Chinese subsidies are allocated to innovation and technology promotion, which reveal that: (i) innovation activities are focused on high-tech firms; (ii) selected targets for subsidizing are based on firm features correlated with exporting.

In our (empirically plausible) context, in which there is complementarity between inputs and substitutability between sectors, numerical calculations describing dynamic equilibrium towards a stable and unique steady state show that subsidies under the price-channel mechanism affect the technological-knowledge bias. This bias, in turn, affects in a positive way the exports sector, the growth rate (e.g., Acemoglu, 2009, Part IV), the relative demand for relatively skilled labour and (thus) the skill-premium—in line with the developed and developing countries path, since the 1980s (e.g., Acemoglu, 2009, Ch. 15).

After the theoretical analysis of the effects of subsidies to export producers, the paper provides a quantitative analysis to study the relationship between subsidies and exports in a large dataset of Portuguese firms for the period 1996–2003. By using propensity score matching procedures, this latter analysis takes into account the theoretical results and a few recent related empirical studies (e.g., Girma et al., 2009b, for German firms; Görg et al., 2008, for Irish firms). In fact, in line with previous empirical studies, involving other countries, our empirical findings reveal that production subsidies have little impact on the likelihood that domestic firms will begin to export. Nevertheless, in line with the predictions of our theoretical model, empirical results also show evidence that production subsidies increase the wage premium of exporters and the relative dimension (size) of internationalized firms relative to domestic ones.

[2] This author use the China to show that, in each country, skilled labour is affected to the exporter sector.

At another level, as production subsidies, in our database, are not specifically oriented to enhance exports but are devoted to promote employment, to support specific industries (eventually in some regions) and to help specific firms in difficulties, then we extend our analysis on the impact of such subsidies on general firm performances. We argue such analysis is of clear interest given that according to the EU Treaty, any State aid to firms has in common the fact that they are granted by a member State or through State resources and that they favour certain undertakings or the production of certain goods. Nevertheless, they may also distort or threaten to distort competition, affecting trade between member States. Thus, new State interventions could be needed to reach a better allocation of resources, but they may also harm the competition environment with negative consequences.

In this framework, the consequences of subsidies to firms could be either positive or negative and previous studies are not sufficiently clear: Bergström (1998) and Skuras et al. (2004) found that subsidized investments under regional development frameworks (structural fund programs) were ineffective. In this line, Gadd et al. (2009) present a summary on similar previous studies: (i) some positive effects on employment and on the dynamics of turnover and employment are reported for subsidized firms; (ii) negative effects on productivity growth rates are also observed in subsidized firms. Using a propensity score matching approach, the study of Gadd et al. (2009) for Swedish firms, concluded that subsidies enhanced employment growth levels of subsidized firms, but there was no positive effect on firms' productivity.

This paper is organised as follows. Section 2 presents the theoretical model framework; Section 2.4 derives the steady state and Section 2.5 analyzes governmental intervention under the model. Section 3.1 describes the data used. Section 3.2 reveals some evidence on subsidies and exports in Portuguese firms. Section 3.3 evaluates the effects of production subsidies on exports. Section 3.4 extends the analysis of subsidy effects on other firms' general variables. Section 4 concludes the paper.

2. Model set-up and theoretical analysis

2.1. Product and factor markets

Following Afonso (2006), each perfectly competitive final good $n \in [0, 1]$ is produced either by the Domestic or the Exports sector. In line with Rodrik (2006), the former (latter) uses relatively unskilled (skilled) intensive labour, L (H), and a continuum set of intermediate goods, $j \in [0, J]$ ($j \in]J, 1]$). The output of n, Y_n, at time t is given by:[3]

$$Y_n(t) = A\left\{\left[\int_0^J \left(q^{k(j,t)} x_n(k,j,t)\right)^{1-\alpha} dj\right][(1-n)lL_n]^{\alpha} + \left[\int_J^1 \left(q^{k(j,t)} x_n(k,j,t)\right)^{1-\alpha} dj\right][n\ \ h\ \ H_n]^{\alpha}\right\}. \quad (1)$$

$A > 1$ is the exogenous productivity level. In the Schumpeterian tradition, integrals denote the aid of intermediate goods: each j quantity, x, is quality-adjusted; the quality upgrade is $q > 1$, and k is the top rung at t. The expressions with exponent $\alpha \in]0, 1[$ represent the role of labour inputs. An absolute productivity advantage of H over L is accounted for by $h \geq l = 1$. A relative productivity advantage of either labour type is captured by the terms n and $(1-n)$, which implies that H is relatively more productive in final goods indexed by larger ns, and *vice versa*. The optimal choice for the sector at time t is reflected in the endogenous threshold final good $\bar{n}$, where the switch of production from L to H is advantageous. It follows from profit maximisation by producers of final goods, profit maximisation by monopolist firms of intermediate goods

[3] Even if we consider that exports are mainly goods and non-exports are mainly services, the cut assumed is straightforward. Indeed, services like tourism are now an important export industry.